

Remarks

Claims 1, 3-11, 13-21, and 23-55 are pending in the subject application. By this Amendment, claims 1, 11, 21, and 34 have been amended, claim 55 has been canceled, and new claims 56-58 have been added. Support for amended claims 1, 11, and 21 can be found, at least, at [0014] and [0015]. Support for new claims 56-58 can be found, at least, at [0015]. Claim 34 has been amended to correct a typographical error. Applicant asserts that these claim amendments should not be taken as an indication of applicant's agreement with or acquiescence to the rejections presented. The undersigned avers that no new matter has been introduced by these amendments. Accordingly, claims 1, 3-11, 13-21, 23-54, and 56-58 are currently before the Examiner for his consideration. Favorable consideration of the claims now presented, in view of the remarks and amendments set forth herein, is earnestly solicited.

Claims 11, 13-20, and 39-46 have been rejected under 35 U.S.C. §101 because the claims appear to be directed to a software embodiment and not a hardware embodiment, where a machine claim is directed towards a system, apparatus, or arrangement. Claim 11 has been amended herein to clarify that claim 11 is directed to a system comprising a data store, a processor, and a computer-readable storage medium. As claimed, the computer-readable storage medium has a computer program stored thereon executable by the processor which permits the program's functionality to be realized. Thus, the applicant submits that the claimed invention as amended is directed to patent eligible subject matter and respectfully requests reconsideration and withdrawal of the rejection of claim 11 under 35 U.S.C. §101.

Claims 13-20 and 39-46 depend from amended claim 11 and therefore inherit its limitations. Therefore, for the reasons already discussed, the applicants respectfully request reconsideration and withdrawal of the rejection of claims 13-20 and 39-46 under 35 U.S.C. § 101. Moreover, claim 39, as amended, further recites an additional hardware element, a transducer. As described in the specification, a transducer is an apparatus "capable of detecting an acoustic sound source and converting the sound wave to an analog signal." [0023]. Thus, the applicant submits that the claimed invention as amended is directed to patent eligible subject matter and respectfully requests reconsideration and withdrawal of the rejection of claims 11, 13-20, and 39-46 under 35 U.S.C. §101.

Claims 1, 11, 21, and 31-54 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Bayya *et al.* (U.S. Patent No. 6,446,038; hereinafter “Bayya”) in view of Treurniet *et al.* (U.S. Patent No. 7,164,771; hereinafter “Treurniet”). The applicant respectfully traverses this grounds for rejection as a *prima facie* case of obviousness has not been presented. The applicant respectfully requests reconsideration. New claims 56-58, depending from claims 1, 11, and 21, respectively, have been added and incorporate the limitation “wherein the at least one measure of vocal quality is strain.” The applicant notes that such a limitation is not disclosed by either Bayya or Treurniet.

Three criteria must be met to establish *prima facie* case of obviousness. First, the prior art reference, or combination of references, must teach or suggest all the claim limitations. Second, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference. Finally, there must be a reasonable expectation of success. Applicant respectfully traverses the rejection since the cited reference does not teach or suggest all the claim limitations, the cited reference does not provide any suggestion or motivation to modify the Bayya *et al.* reference to arrive at the subject invention as claimed in claims 1, 11, and 21, and there is no reasonable expectation of success of such a modification.

Claims 1, 11, and 21 have been amended to incorporate the limitation “wherein each of the at least one measure of vocal quality are selected from the group consisting of roughness, hoarseness, strain, and breathiness”. Support for this amendment can be found throughout the specification and, at least, at [0014] and [0015]. The applicant notes that neither Bayya nor Treurniet teach or suggest determining a measure of vocal quality selected from the group consisting of roughness, hoarseness, strain, and breathiness. Further, claims 1, 11, and 21 each incorporate the limitations of “processing a voice signal using an auditory model to produce a processed voice signal, identifying one or more voice quality attributes of said voice signal by analyzing said processed voice signal, and comparing said one or more voice quality attributes of said voice signal with one or more baseline vocal quality attributes in order to determine at least one measure of the voice signal”. At page 6, the Office Action concedes Bayya does not use an auditory model, but assert that it would have been obvious to modify Bayya to include this feature

for the purpose of better estimating how the signal will be perceived. The applicant asserts there would have been no motivation for Bayya *et al.* to process a voice signal using an auditory model as Bayya is interested in measuring how speech is corrupted in a communication system.

Further, Bayya *et al.* does not teach “identifying one or more voice quality attributes of said voice signal by analyzing said processed voice signal, and comparing said one or more voice quality attributes of said voice signal with one or more baseline vocal quality attributes in order to determine at least one measure of the voice signal”. Rather, Bayya *et al.* “determines an amount of distortion present in the corrupted speech signal according to a plurality of distortion measures based on the set of speech reference vectors **16** (see col. 3, lines 17-23 and Figure 1). In this way, Bayya compares the corrupted speech to speech reference vectors, where the reference vectors are obtained from a large number of clean speech samples (see col. 2, lines 57-58), in order to determine distortion in the corrupted speech signal caused by the communication system. As taught at col. 3, lines 21-23, the output of the comparison of the corrupted speech signal to the reference vector in Bayya is a corresponding signal **18** representing the amount of distortion in the corrupted speech signal caused by the communication system.

This is very different from the claimed invention of claims 1, 11, and 21, where the voice signal being diagnosed need not have passed through a communication system, (although the voice signal may have), but can be any voice signal. Further, with respect to the claimed embodiments of claims 1, 11, and 21, the voice signal is not compared to reference vectors as in Bayya *et al.*, but is processed using an auditory model and then the processed voice signal is analyzed to identify one or more voice quality attributes. The one or more voice quality attributes are then compared to one or more baseline vocal quality attributes in order to determine at least one measure of vocal quality of the voice signal.

On page 6, 1<sup>st</sup> full paragraph, of the Office Action, in regard to the limitation “comparing ... in order to determine at least one objective measure of vocal quality of the voice signal” the Office Action refers to col. 3, lines 1-8 and equation 6 using, these cepstral values to determine a distortion measure, of Bayya. However, the embodiments of the subject invention as claimed in claims 1, 11, and 21, involve “identifying one or more voice quality attributes prior to comparing the one or more voice quality attributes with the one or more baseline vocal quality attributes”. In

Bayya, the reference vectors are compared with a corrupted speech signal to get the corresponding signals **18** representing the distortion in the corrupted speech signal. The measured distortion signals **18** are then “processed by the neural network **22**” (see col. 5, lines 28-34) to “determine the quality of the speech”.

Further, Bayya teaches the cepstral coefficient vectors extracted from the reference vectors, where the reference vectors are obtained from a large number of clean speech samples recorded over cellular channels in a quiet environment (see col. 2, lines 57-60), in order to determine distortion in the corrupted speech caused by a communication channel. The reference vectors of Bayya representing uncorrupted clean speech are necessary to evaluate a communication channel since input speech signal is not available in an output-based objective measure (see col. 2, lines 55-56). Accordingly, “quality of the speech” as used in Bayya is quite different than “voice quality” as used in claims 1, 11, and 21. Applicant respectfully asserts that Bayya fails to disclose each of the above-described features and teaches away from their use.

Further, with respect to new claim 55, the applicant asserts that the claimed baseline vocal quality attributes, extracted from at least one baseline normal voice signal are very different from the cepstral coefficient vectors extracted from the reference vectors of Bayya. The corrupted speech of Bayya is evaluated based on the reference vectors for assessing the quality of speech communication systems while the claimed voice signal is evaluated based on the baseline normal voice signal for measuring voice quality of the voice signal, independent from communication systems. Indeed, the claimed measures of vocal quality of the voice signal such as roughness, hoarseness, and breathiness are used to evaluate a speaker’s vocal quality itself. Treurniet does not teach such limitations. There is no teaching or suggestion in Bayya and Treurniet to extract the one or more baseline vocal quality attributes from at least one baseline normal voice signal.

Furthermore, the applicant asserts that there would have been no motivation for Bayya to process a voice signal using the peripheral ear model of Treurniet (“auditory model”) as Bayya is interested in measuring how speech is corrupted in the speech communication system (see col. 2, lines 54-60, col. 5, lines 48-49, and the preamble of claim 1 of Bayya).

Accordingly, applicant asserts that there is no teaching, suggestion or motivation to modify the teachings of Bayya, or to combine the teachings of Bayya and Treurniet, to arrive at the subject

invention as claimed in claims 1, 11, and 21. Accordingly, the applicant requests withdrawal of the rejection of claims 1, 11, 21, and 31-54 under 35 U.S.C. §103(a).

Claims 3-5, 13-15, and 23-25 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Bayya (U.S. Patent No. 6,446,038) in view of Treurniet (U.S. Patent No. 7,164,771), and in further view of Deal *et al.* (“Some Waveform and Spectral Features of Vowel Roughness”; hereinafter “Deal”). The deficiencies of Bayya and Treurniet with respect to the rejection of claims 1, 11, and 21 have been discussed above, and Deal does not cure such defects. The applicant submits that Bayya, Treurniet, and Deal, alone or in combination, do not teach or suggest the subject invention as claimed in claims 3-5, 13-15, and 23-25. Accordingly, the applicant respectfully requests reconsideration and withdrawal of the rejection of claims 3-5, 13-15, and 23-25 under 35 U.S.C. §103(a).

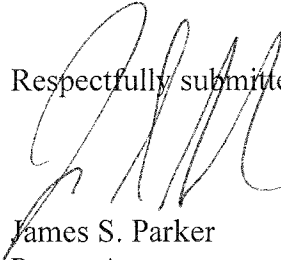
Claims 6-10, 16-20, and 26-30 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Bayya (U.S. Patent No. 6,446,038) in view of Treurniet (U.S. Patent No. 7,164,771), and in further view of Hillenbrand *et al.* (“Acoustic Correlates of Breathy Vocal Quality”; hereinafter “Hillenbrand”). The deficiencies of Bayya and Treurniet with respect to the rejection of claims 1, 11, and 21 have been discussed above, and Hillenbrand does not cure such defects. The applicant submits that Bayya, Treurniet, and Hillenbrand, alone or in combination, do not teach or suggest the subject invention as claimed in claims 6-10, 16-20, and 26-30. Accordingly, the applicant respectfully requests reconsideration and withdrawal of the rejection of claims 6-10, 16-20, and 26-30 under 35 U.S.C. §103(a).

In view of the foregoing remarks and amendments to the claims, applicant believes that the currently pending claims are in condition for allowance, and such action is respectfully requested.

The applicant also invites the Examiner to call the undersigned if clarification is needed on any of this response.

The Commissioner is hereby authorized to charge any fees under 37 C.F.R. §§ 1.16 or 1.17 as required by this paper to Deposit Account 19-0065.

Respectfully submitted,



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